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**“पुराने को छोड़ नये के तरफ”**

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 8909-3 (1978): Fixed Resistors, General Purpose, Power,  
Part 3: Type FRP 2 [LITD 5: Semiconductor and Other  
Electronic Components and Devices]

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Bhartṛhari—Nītiśākām

“Knowledge is such a treasure which cannot be stolen”





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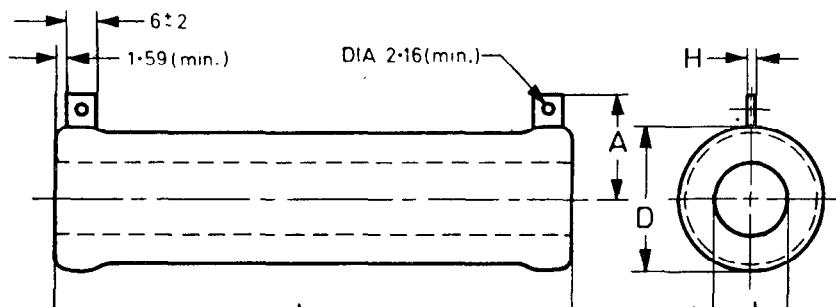


# SPECIFICATION FOR FIXED RESISTORS, GENERAL PURPOSE, POWER

## PART III TYPE FRP 2

**0. General** — This standard shall be read in conjunction with IS : 8909 (Part I) - 1978 'Specification for fixed resistors, general purpose, power: Part I General requirements and methods of tests'.

**1. Outline and Dimensions** — The outline and dimensions shall be according to Fig. 1 and Table 1.



All dimensions in millimetres.

Typical Construction: Wire-Wound, Vitreous Enamelled/Silicon Coated, Non-Insulated.

FIG. 1 OUTLINE AND DIMENSIONS

TABLE 1 DIMENSIONS AND RATINGS  
( Clause 1 )

Style	Rated Dissipation (W at 70°C)	Dimensions, mm					Rated Limiting Element Voltage VDC or RMS	Resistance Range E24 Series	Critical Resistance	Mass (Max) g
		L Max	D Max	d Max	A	H Min				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
FRP 2-10	10	27	15	7.7	16±3.5	0.4	200	10Ω to 2.4kΩ	Not applicable	7
FRP 2-15	15	40	15	7.7	16±3.5	0.4	250	10Ω to 6.2kΩ	4.16kΩ	11
FRP 2-25	25	78	15	7.7	16±3.5	0.4	750	10Ω to 18kΩ	4.16kΩ	20
FRP 2-50	50	104	29	14.3	21±3.5	0.56	1 000	10Ω to 39kΩ	20kΩ	60
FRP 2-100	100	155	33.5	19	31±3.5	0.71	2 000	15Ω to 91kΩ	40kΩ	190
FRP 2-140	140	205	33.5	19	31±3.5	0.71	2 750	20Ω to 150kΩ	54kΩ	260
FRP 2-180	180	269	33.5	19	31±3.5	0.71	3 500	30Ω to 180kΩ	68kΩ	300

**Note 1** — See 4 for derating curve. The rated dissipation in this table is given for horizontal mounting or for vertical mounting with blocked ends.

**Note 2** — Resistors having radial tag terminations are not intended to be mounted by their terminations ( see Fig. 2 for mounting details ).

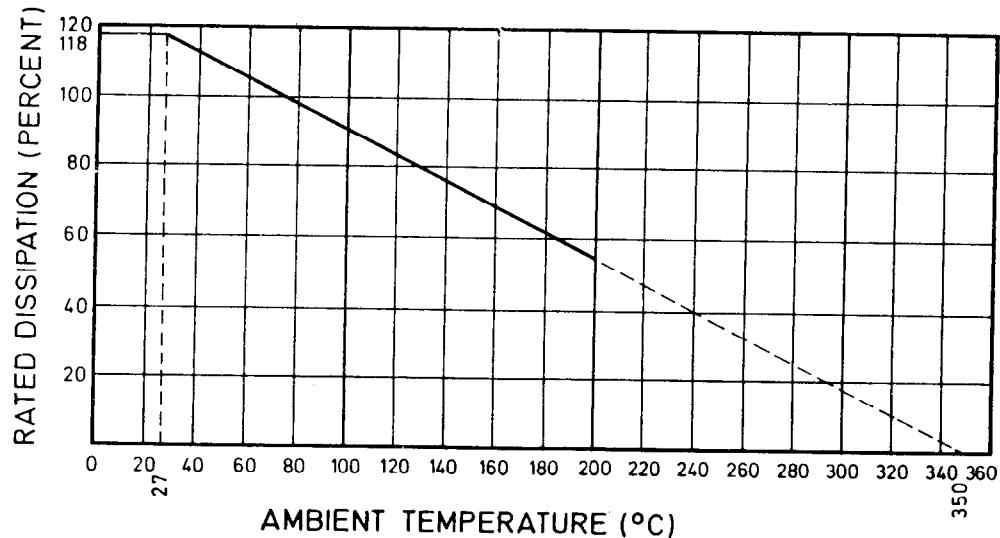
**2. Ratings** — Ratings shall be as specified in Table 1.

**Note** — For rated dissipation at temperature other than 70°C, reference should be made to the derating curve shown in 4.

**3. Characteristics**

a) Selection tolerance	±5 percent
b) Stability class	±5 percent
c) Temperature coefficient	±200 ppm/°C
d) Vibration	10 to 2 000 Hz, 20 g, 3×4 h
e) Acceleration	1 km/s <sup>2</sup>
f) Bump	4 000 bumps, 40 g
g) Maximum surface temperature	350°C
h) Climatic category	55/200/56

**4. Derating Curve**

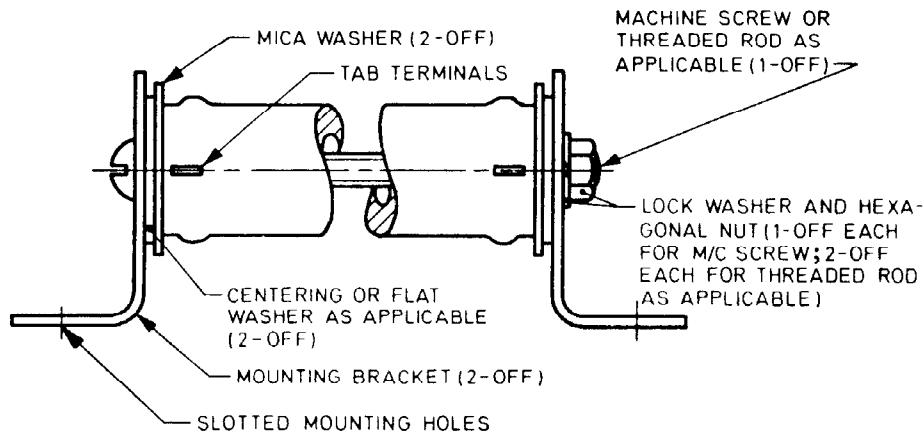


**5. Marking** — See 7 of IS : 8909 (Part I)-1978.

**6. Material, Construction and Workmanship** — See 5 of IS : 8909 (Part I)-1978.

**7. Classification of Tests** — See 8.1 of IS : 8909 (Part I)-1978.

**7.1 General Conditions for Tests** — See 8.2 of IS : 8909 (Part I)-1978. The same measuring set shall be used for any one test but not necessarily for all the tests. A typical method of mounting incorporating a bracket assembly is shown in Fig. 2.



**FIG. 2 MOUNTING DETAILS**

7.1.1 The test schedule and the requirements shall be in accordance with Table 2.

TABLE 2 TEST SCHEDULE AND REQUIREMENTS

Sl. No.	Test (2)	Clause Ref in IS : 8909 (Part I) - 1978 (3)	Condition of Test (4)	Requirement (5)
I)	All Samples			
a)	Visual examination	8.4.1	—	The workmanship and finish shall be satisfactory. The marking shall be legible. Materials used as coating or enclosure shall not extend by more than 2 mm along the terminal beyond the body of the resistor
b)	Dimensions	8.4.2	—	The dimensions of the resistors and their termination shall conform to values given in Table 1 read with Fig. 1
c)	Mass	8.4.3	—	As in Table 1
d)	Resistance	8.3.1	—	The resistance value at 27°C shall correspond with the rated resistance taking into account the tolerance
II)	First Group			
a)	Solderability	8.4.6	—	—
1)	Visual examination	8.4.1	—	There shall be no damage
b)	Robustness of resistor body	8.4.4	—	—
1)	Visual examination	8.4.1	—	There shall be no damage
c)	Robustness of terminations	8.4.5	—	—
1)	Visual examination	8.4.1	—	There shall be no damage
2)	Resistance	8.3.1	—	Change in resistance value shall not exceed $\pm 0.5$ percent or 0.05 ohms whichever is greater
d)	Bump*	8.4.8	—	—
1)	Visual examination	8.4.1	—	There shall be no damage
2)	Resistance	8.3.1	—	Change in resistance value shall not exceed $\pm 0.5$ percent or 0.05 ohms whichever is greater
e)	Vibration*	8.4.7	10 to 2000 cycles 20 g, duration 3×4 h	—
1)	Visual examination	8.4.1	—	There shall be no damage
2)	Resistance	8.3.1	—	Change in resistance value shall not exceed $\pm 0.5$ percent or 0.05 ohms whichever is greater
f)	Acceleration* (steady state)	8.4.10	1 km/s <sup>2</sup>	—
1)	Visual examination	8.4.1	—	There shall be no damage
2)	Resistance	8.3.1	—	Change in resistance value shall not exceed $\pm 0.5$ percent or 0.05 ohms whichever is greater
g)	Rapid change of temperature	8.5.3	—	—
1)	Resistance	8.3.1	—	Change in resistance value shall not exceed $\pm 2.0$ percent or 0.5 ohms whichever is greater

\*Throughout the test, the resistors shall be connected to a suitable monitoring device to determine electrical discontinuity. It is desirable that the detecting equipment shall detect any interruption with a duration of 0.1 millisecond or greater.

(Continued)

TABLE 2 TEST SCHEDULE AND REQUIREMENTS — Contd

Sl No.	Test	Clause Ref in IS : 8909 (Part I) - 1978	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
h)	Climatic sequence	8.5.1	—	—
1)	Dry heat	8.5.1.2	At maximum category temperature (+200°C)	—
2)	Damp heat (accelerated) — first cycle	8.5.1.3	One cycle	—
i)	Visual examination	8.4.1	—	There shall be no damage
3)	Cold	8.5.1.4	Two hours at minimum category temperature (-55°C)	—
e)	i) Visual examination	8.4.1	—	There shall be no damage
4)	Low air pressure	8.5.1.5	Degree of Severity: 1 kPa (Approximate altitude 30 000 metres) The voltage shall be applied between terminations	There shall be no breakdown or spark or flashover
5)	Damp heat (accelerated) — remaining cycles	8.5.1.6	—	—
i)	Visual examination	8.4.1	—	There shall be no damage
ii)	Resistance	8.3.1	—	Change in resistance value shall not exceed ±5.0 percent or 0.05 ohms whichever is greater
III)	Second Group			
a)	Damp heat (long term)	8.5.2	The loading shall be 50 percent of the rated wattage or the limiting voltage whichever is less	—
1)	Visual examination	8.4.1	—	There shall be no damage
2)	Resistance	8.3.1	—	Change in resistance value shall not exceed ±5.0 percent or 0.05 Ω whichever is greater
IV)	Third Group			
a)	Endurance	8.6.3	—	—
1)	Resistance	8.3.1	—	Change in resistance value shall not exceed ±5 percent or 0.05 Ω whichever is greater
b)	Flammability	8.6.4	—	—
V)	Fourth Group			
a)	Short term overload	8.3.6	2.5 times rated voltage subject to a maximum overload of twice the limiting voltage shall be applied for a period of 5 seconds	—
1)	Resistance	8.3.1	—	Change in resistance value shall not exceed ±2.0 percent or 0.05 Ω whichever is greater
b)	Mould growth	8.6.1	—	—
VI)	Fifth Group			
a)	Resistance to solvents	8.6.5	—	—
VII)	Sixth Group			
a)	Temperature coefficient	8.3.4	—	±200 ppm/°C
b)	Temperature rise (applicable to critical value and below)	8.3.5	—	Temperature rise shall not exceed 280 C
c)	Salt mist	8.6.2	—	—